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ABSTRACT

A survey examined the relationship between school climate and reading performance using data from the 1983-84 National Assessment of Educational Progress (NAEP) Reading Assessment. The NAEP survey asked a number of questions about possible school problems, such as discipline, teacher commitment, and standards for students. These items were analyzed individually and also combined into a composite measure of school climate. The study revealed that 4th, 8th, and 11th grade students in schools with a better school climate--as measured by the composite measure--tended to score higher on the NAEP Reading Assessment. School climate was more positive in elementary schools, private schools, and schools with lower proportions of students participating in the federal school lunch program. For individual school problems, reading performance was lower for students attending schools where a particular problem was rated more seriously, but association between the severity of a given problem and reading performance disappeared when the background characteristics of students were taken into account. For the composite measure of school climate, based on eight of the school problems, reading performance was higher in schools with a better climate even after controlling for student characteristics. However, the data only show that reading performance and school climate were associated; they cannot demonstrate whether better climate caused higher reading scores. (SR)

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Survey Report October 1988

School Climate and Reading Performance

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Highlights

The relationship between school climate and reading performance was examined using data from the 1983-84 National Assessment of Education Progress (NAEP) Reading Assessment. The NAEP survey asked a number of questions about possible school problems, such as discipline, teacher commitment, and standards for students. These items were analyzed individually and also combined into a composite measure of school climate. The study revealed that 4th, 8th, and 11th grade students in schools with a better school climate—as measured by the composite measure—tended to score higher on the NAEP Reading Assessment.

School Climate

School climate was more positive in:

- Elementary schools,
- Private schools, and
- Schools with lower proportions of students participating in the Federal school lunch program.

Reading Performance

For individual school problems,

- Reading performance was lower for students attending schools where a particular problem was rated more seriously, but
- Association between the severity of a given problem and reading performance disappeared when the background characteristics of students were taken into account.

For the composite measure of school climate, based on eight of the school problems,

- Reading performance was higher in schools with a better climate even after controlling for student characteristics.
- However, the data only show that reading performance and school climate were associated; they cannot demonstrate whether better climate caused higher reading scores.

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Introduction

Effective schools literature indicates that a positive school climate encourages student achievement.[1] School-level characteristics are believed to shape the environment in which the classroom functions. The best-known model of an effective school includes five essential characteristics: strong administrative leadership, high expectations for children's achievement, an orderly atmosphere conducive to learning, an emphasis on basic-skill acquisition, and frequent monitoring of pupil progress.[2] In effective schools, principals, teachers, parents, and students work together to create a climate conducive to learning.

The 1983-84 National Assessment of Educational Progress (NAEP) Reading Assessment provides a database suitable for examining the relationships between some of the school characteristics in the effective schools model and student achievement. NAEP is a cross-sectional survey, and thus not ideal for studying the effects of school climate on achievement. However, if it is assumed that the 4th, 8th, and 11th graders in the survey attended the same school for a number of years, it is reasonable to compare the reading performance of students in schools with differing characteristics. Using NAEP data, it is possible to look at differences between schools on various school problems and the extent to which the presence of such problems are related to student reading performance. The 1983-84 NAEP Reading Assessment is the source for all estimates in this report.

All comparisons cited in the text are statistically significant at the .05 level. Standard errors and sample sizes are in appendix tables A3 through A7.

School Environment

Student Enrollment by Principals' Ratings of School Problems

The NAEP school sample is representative of schools with a 4th, 8th, or 11th grade. Principals of these schools were asked to rate a series of potential problems in their school as "not a problem," "minor," "moderate," or "serious." The school problems in this analysis were student absenteeism, lack of parent interest, discipline, lack of teacher commitment/motivation, teacher absenteeism, teacher turnover, low standards for students, and vandalism.[3]

Principals perceived lack of parent interest and discipline as greater problems than the other problems they were asked to rate (table 1). Lack of parent interest was a "moderate" problem in schools attended by approximately one-third of students at all three grade levels, and a "serious" problem in schools attended by one out of eight 11th graders. Discipline was a "moderate" problem in schools attended by 16 percent of 4th graders and 23 percent of 8th graders and 11th graders.

Student absenteeism was also considered a problem at the high school level; 40 percent of 11th grade students attended schools in which absenteeism was rated a "moderate" problem and 11 percent attended schools in which it was rated a "serious" problem.

Based on principals' ratings, the more serious problems were student-related, for example, discipline, parental interest, and absenteeism. However, several school-based problems were a concern, particularly at the high school level. Only 49 percent of 4th graders, 33 percent of 8th graders, and 17 percent of 11th graders attended schools in which lack of teacher commitment/ motivation was rated as "not a problem." About one out of five 11th graders attended schools in which principals rated lack of teacher commitment/motivation, teacher absenteeism, and low standards for students as "moderate" problems.

School Climate

School climate, as discussed in the effective schools literature and elsewhere, refers to the overall environment within a school. Specific elements, such as the school problems rated by principals in NAEP, are components of school climate, and climate represents the aggregate influence of such individual components. A measure of school climate for each school was created from the NAEP data by averaging a principal's ratings of the eight potential school problems in her/his school. For this report, discussions of results related to "school climate" are based on this composite measure.

Table 1.—Percentage distribution of students, by principals' ratings of school problems, by grade and problem: 1984

Grade and school problem	Extent of problem in school			
	Not a problem	Minor	Moderate	Serious
4th grade				
Student absenteeism	47.4	40.1	10.6	2.0
Lack of parent interest	29.0	35.5	29.7	5.8
Discipline	31.2	51.9	15.8	1.1
Lack of teacher commitment/motivation	49.2	42.0	8.5	0.3
Teacher absenteeism	49.9	34.4	5.5	0.2
Teacher turnover	74.2	21.8	3.6	0.4
Low standards for students	61.0	31.3	6.4	1.3
Vandalism	57.4	38.3	4.3	0.0
8th grade				
Student absenteeism	33.1	47.7	17.4	1.8
Lack of parent interest	23.6	36.7	30.9	8.8
Discipline	18.3	58.2	22.9	0.5
Lack of teacher commitment/motivation	33.3	54.7	11.0	1.0
Teacher absenteeism	46.2	46.7	6.3	0.9
Teacher turnover	66.0	27.1	5.1	1.8
Low standards for students	44.8	44.7	9.8	0.6
Vandalism	45.1	47.6	7.2	0.2
11th grade				
Student absenteeism	16.1	33.7	39.6	10.5
Lack of parent interest	18.9	32.6	35.9	12.6
Discipline	14.7	61.2	22.5	1.5
Lack of teacher commitment/motivation	17.2	57.8	21.8	3.1
Teacher absenteeism	29.4	50.6	18.2	1.8
Teacher turnover	58.8	32.1	8.3	0.9
Low standards for students	41.4	39.3	18.1	1.2
Vandalism	27.9	58.7	12.7	0.7

NOTE: May not add to 100 percent due to rounding.
SOURCE: National Assessment of Educational Progress, 1983-84 Reading Assessment, unpublished calculations, 1987.

The composite measure of school climate, as was the case for many of the individual school problems, showed considerable differences across the three grade levels (table 2). School climate was most positive in schools with a 4th grade and least positive in schools with an 11th grade. Principals in schools with an 11th grade were less likely to rate the eight potential items as "not a problem" in their school than those in schools with a 4th grade, and more likely to have an average rating of "minor" or "moderate." (No school at any grade level had an average rating of "serious" across the eight problems.) Over half the schools with a 4th or 8th grade had an average rating of "not a problem." Only 12 percent of schools with an 11th grade had an average rating of "not a problem," but one out of seven had an average rating of "moderate."

Table 2.--Percentage distribution of schools by average rating of school problems, by grade and control of school: 1984

Grade and control of school	Average rating of school problems		
	Not a problem	Minor	Moderate
4th grade	56.4	42.3	1.3
Public	53.9	44.4	1.7
Private	66.1	34.0	0.0
8th grade	53.3	44.4	2.3
Public	46.9	49.9	3.2
Private	67.6	32.1	0.3
11th grade	11.9	73.9	14.2
Public	9.1	73.4	17.5
Private	22.6	76.0	1.4

NOTE: May not add to 100 percent due to rounding.

SOURCE: National Assessment of Educational Progress, 1983-84 Reading Assessment, unpublished calculations, 1987.

Besides grade, type of control is a school characteristic possibly related to climate. There is evidence of a more favorable school climate and higher achievement in private than in public schools.[4] If school climate is related to reading performance, then climate may be a partial explanation for higher private school reading scores.

Principals' average ratings of school problems showed fewer problems in private schools than in public schools, particularly at the high school level (table 2). At all three grade levels, principals' average rating of the elements in the school climate measure was more often "not a problem" in private than in public schools. In schools with an 11th grade, 18 percent of public schools and 1 percent of private schools had average ratings of "moderate." In private schools as well as in public schools, climate was rated least positively in schools with an 11th grade.

A variety of factors may contribute to the differences in climate between private and public schools. For example, student background may be more conducive to the development of a positive school climate in private schools. At the school level, NAEP did not collect much data about characteristics of the students in each school. The data do show private schools at all three grade levels had proportionately fewer students participating in the Federal school lunch program than public schools and school climate was better in schools with fewer students in the lunch program (table 3).[5]

The small number of private schools in the NAEP school sample limits the ability to make comparisons of public and private schools controlling for other factors. However, in three of the four possible comparisons, school climate was more positive in private than in public schools after controlling for the percentage of students in the Federal school lunch program. For example, in schools with an 11th grade and less than 10 percent of students in the lunch program, 13 percent of public schools had an average rating of "moderate" compared with 2 percent of private schools with those characteristics. The one exception to the pattern was for schools with a 4th grade; school climate was similar in public and private schools with less than 10 percent of the students enrolled in the Federal lunch program.

The 1983-84 data from the NAEP reading assessment showed considerable variation among schools in school climate. Three school characteristics--level, control, and percentage of students in the Federal student lunch program--were associated with the composite measure of school climate. Principals' perceived fewer problems at lower grade levels, in private schools, and with lower proportions of students participating in the Federal student lunch program. The differences by grade level were substantial and appeared for nearly all of the individual school problems as well as the composite climate measure.

Table 3.—Percentage distribution of schools by average rating of school problems, by grade, control of school, and proportion of students in Federal school lunch program: 1984

Grade, control of school, and proportion of students in school lunch	Average rating of school problems		
	Not a problem	Minor	Moderate
4th grade	56.4	42.3	1.3
Under 10 percent school lunch	72.2	27.9	0.0
Public	76.2	23.8	0.0
Private	69.5	30.5	0.0
10 to 49 percent school lunch	50.2	49.3	0.5
Public	50.1	49.5	0.5
Private	—	—	—
50 percent or more school lunch	51.9	44.9	3.3
Public	48.8	47.4	3.9
Private	68.9	31.1	0.0
8th grade	53.3	44.4	2.3
Under 10 percent school lunch	68.8	31.2	0.0
Public	—	—	—
Private	79.0	21.1	0.0
10 to 49 percent school lunch	51.2	48.3	0.5
Public	51.2	48.3	0.5
Private	—	—	—
50 percent or more school lunch	45.7	46.9	7.4
Public	46.1	45.1	8.8
Private	43.9	54.6	1.4
11th grade	11.9	73.9	14.2
Under 10 percent school lunch	19.1	73.7	7.2
Public	19.2	67.7	13.2
Private	19.1	79.1	1.8
10 to 49 percent school lunch	8.7	77.1	14.2
Public	8.8	76.8	14.4
Private	—	—	—
50 percent or more school lunch	5.1	68.4	26.6
Public	4.3	67.7	27.9
Private	—	—	—

— Insufficient sample size for estimates.
NOTE: May not add to 100 percent due to rounding.
SOURCE: National Assessment of Educational Progress, 1983-84 Reading Assessment, unpublished calculations, 1987.

Reading Performance and School Climate

The study of the relationship between reading perfomance and school climate was conducted in two stages. The first stage involved investigating the relationship between the individual school problems variables and reading performance. Are all, some, or none of principal ratings of these problems related to reading scores? If there is such an association, does it hold for only certain types of problems or circumstances? The second stage involved investigating the relationship between the composite school climate measure and reading scores.

School Problems

Reading performance[6] was lower for students attending schools where a given problem was rated more seriously than for students in schools where the problem was not present (table 4). For each of the eight problems,[7] students in schools where the problem was rated "moderate" had significantly lower reading scores than students attending schools where the factor was "not a problem." The differences were generally 10 to 15 points at all three grade levels. Eleventh-grade students in schools where student absenteeism or lack of parent interest or both were rated "serious" scored 20 and 25 points lower on the reading proficiency scale than students in schools where these items were "not a problem." However, after taking student background characteristics into account, there was not a significant difference in reading scores for any individual school problem.

School Climate

While there were not significant differences in reading performance for individual school problems after controlling for student background characteristics, the presence of several problems in a school could be related to student achievement. Schools with a poor learning environment are likely to have a variety of problems. What may be important is not whether a school has a particular problem but the overall environment, that is, whether there are many problems or few. Thus the school climate measure, for which the principals' ratings were averaged across the eight problems, may show a relationship with reading performance after controlling for student background characteristics even though the individual problems did not.

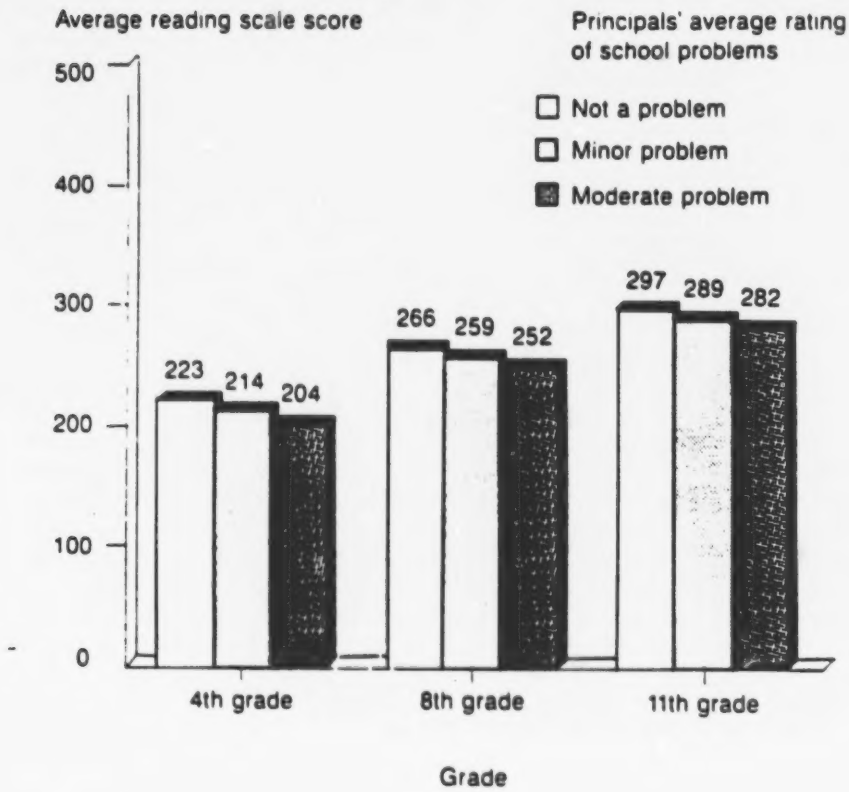
After controlling for student characteristics, students attending schools with a positive school climate had significantly higher reading performance than those in schools where the climate was less conducive to learning (figure 1). The differences in student reading proficiency scores among levels of average rating on school problems were similar for 4th, 8th, and 11th graders. After accounting for race/ethnicity, language spoken in the home, parental education, and number of reading aids in the home, 4th grade students enrolled in schools with an average rating of "not a problem" scored 20 points higher than students in schools where the average rating of the school problems was "moderate."

Table 4.—Average reading proficiency scale scores by principals' ratings of school problems, by grade and problem: 1984

Grade and school problem	Extent of problem in school			
	Not a problem	Minor	Moderate	Serious
4th grade				
Student absenteeism	222.7	215.1	205.5	202.8
Lack of parent interest	228.9	218.7	208.9	196.0
Discipline	225.8	216.2	206.8	196.6
Lack of teacher commitment/ motivation	219.9	216.5	208.5	196.3
Teacher absenteeism	221.4	212.0	210.6	200.3
Teacher turnover	219.5	211.7	207.6	225.0
Low standards for students	221.1	213.3	205.7	211.1
Vandalism	220.4	214.5	205.7	—
8th grade				
Student absenteeism	267.0	260.0	253.6	243.7
Lack of parent interest	270.3	263.5	254.2	248.0
Discipline	269.0	261.4	254.2	247.4
Lack of teacher commitment/ motivation	264.2	259.8	256.7	252.8
Teacher absenteeism	263.7	260.1	248.1	247.5
Teacher turnover	262.0	259.6	259.1	249.1
Low standards for students	265.7	258.5	251.0	252.0
Vandalism	263.2	260.2	251.0	237.0
11th grade				
Student absenteeism	296.7	293.2	287.5	275.4
Lack of parent interest	301.7	293.4	284.8	275.1
Discipline	298.6	291.0	280.9	271.8
Lack of teacher commitment/ motivation	297.5	289.8	285.4	275.8
Teacher absenteeism	293.5	289.3	286.1	276.7
Teacher turnover	290.9	290.3	281.8	266.6
Low standards for students	295.1	288.2	282.3	268.4
Vandalism	292.3	289.8	285.2	267.4

— No school with a 4th grade was rated by its principal as having a "serious" vandalism problem.
SOURCE: National Assessment of Educational Progress, 1983-84 Reading Assessment, unpublished calculations, 1987.

Figure 1.-- Average adjusted reading proficiency, by average rating on school problems and grade: 1984



NOTE: The 8 potential school problems were student absenteeism, lack of parent interest, discipline, lack of teacher commitment/motivation, teacher absenteeism, teacher turnover, low standards for students, and vandalism. There were no schools with an average rating of "serious." Reading proficiency scale scores were adjusted for race/ethnicity, language spoken in the home, parental education, and number of reading aids in the home. (See technical notes for methodology for computing adjusted scores.)

SOURCE: National Assessment of Educational Progress, 1983-84 Reading Assessment, unpublished tabulations, 1987.

Summary

School climate varied by school characteristics. It was more positive in elementary schools, in private schools, and in schools with lower proportions of students participating in the Federal school lunch program.

The major finding of this analysis is that, taking student background characteristics into account, reading performance was associated with the composite school climate measure but not individual school problems. For those interested in improving reading performance, one implication of this finding is that no single element of school climate appears to be critical. Thus improving a particular dimension of school climate may not increase test scores, while improving several at the same time might.

However, it is important to note that cross-sectional data such as the NAEP data analyzed here can only demonstrate that there is an association between variables, but not the direction of that association. In this case, better performance may contribute to a better school climate, a more positive climate may contribute to better performance, or both. If the direction of the relationship is that good scores foster a better climate, then improving school climate may not lead to higher reading scores.

There is a growing recognition of the importance of school climate in the learning process. Many recent publications have recommended creating a positive school climate--improving components of climate--as a step toward improving achievement in elementary and secondary schools.[8] This analysis supports the view that a positive school climate is associated with higher student performance.

Footnotes

1. S.C. Purkey and M.S. Smith, "Effective schools: A review," The Elementary School Journal, vol. 83 (4) (March 1983):427-452; U.S. Department of Education, Reaching for excellence: An effective schools sourcebook, (Washington, D.C.: U.S. Government Printing Office, 1985); and U.S. Department of Education, What works (Washington, D.C.: U.S. Government Printing Office, 1986); R.R. Edmonds, "Effective schools for the urban poor," Educational Leadership, vol. 37 (1) (October 1979):15-24. A similar model to Edmonds is contained in Steven Bossert, "Effective elementary schools," in U.S. Department of Education, Reaching for excellence: An effective schools sourcebook (Washington, D.C.: U.S. Government Printing Office, 1985):39-53.

2. S.C. Purkey and M.S. Smith, "Effective schools: A review," The Elementary School Journal, vol. 83 (4) (March 1983):427-452.

3. There were 14 potential problems included in the questionnaire. Inadequate materials and equipment and class size were included in preliminary analysis, but were dropped when no relationship to reading scores was found. In addition, physical assaults among students, student abuse of teachers, robbery or theft, and student use of drugs or alcohol were dropped because for at least one grade there was little variation among schools in the principals' ratings of these problems. Most indicated that these were "not a problem" in their school. (See table A7.)

4. J.S. Coleman, T. Hoffer and S. Kilgore, High school achievement: Public, Catholic, and private schools compared (New York, N.Y.: Basic Books, 1982); J.S. Coleman and T. Hoffer, Public and private high schools: The impact of communities (New York, N.Y.: Basic Books, 1987); V. Lee, 1983-84 National Assessment of Educational Progress reading proficiency: Catholic school results and national averages (Washington, D.C.: National Catholic Educational Association, 1985); A. Pallas, "School climate in American high schools," Teachers College Record, vol. 89 (4): forthcoming; D. Ravitch and C. Finn, What do our 17-year-olds know? (New York, N.Y.: Harper & Row, 1987); and U.S. Department of Education, The condition of education, 1988 edition, vol. 1 (Washington, D.C.: U.S. Government Printing Office, 1988).

5. From each student tested, data was collected about the education of both parents. Parental education was the measure of family background used for the analysis of student performance in this analysis. However, such information was not collected at the school level. The only school-level variable that relates to the socio-economic background of the students is the percent of students participating in the Federal school lunch program.

Participation in the school lunch progam is not as good a measure of student background as parental education, particularly for private schools. This measure may understate the percentage of low income children in private schools because of the Federal regulations governing the participation of private school students. If this measure underestimates the proportion of poor children more in private schools than in public schools, then the differences in school climate between public and private schools would be even greater. More private schools would be in the higher categories of percent school lunch and private school climate would appear even more positive relative to public schools than is shown in table 3.

6. The reading proficiency scale was conditioned on 4 of the 8 school problem items used in this analysis: student absenteeism, lack of parent interest, discipline, and low standards for students. Reading proficiency scale score estimates for variables not included in the conditioning may be biased as much as 20 percent. The potential bias tends to be reduced for unconditioned variables that are moderately or highly correlated with conditioned variables. For 4th graders, the correlations between the conditioned and unconditioned school problem items were approximately .2 to .4, with the exception of teacher turnover and conditioned items which was .1 to .2. See National Assessment of Educational Progress, Implementing the new design: The NAEP 1983-84 technical report (Princeton, N.J.: Educational Testing Service, 1986) for a discussion of the scaling procedures and possible biases when estimating relationships between the reading scale and unconditioned variables.

7. With the exception of teacher turnover for students in the 8th grade.

8. See, for example, U.S. Department of Education, Dealing with dropouts: The urban superintendents' call to action (Washington, D.C.: U.S. Government Printing Office, November 1987); What works (Washington, D.C.: U.S. Government Printing Office, 1986).

Technical Notes

The National Assessment of Educational Progress (NAEP) is an ongoing, Congressionally mandated project established to conduct national surveys of the educational attainment of young Americans. It is funded by the U.S. Department of Education and administered by Educational Testing Service (ETS). Since 1969, NAEP has assessed 9-year-olds, 13-year-olds and 17-year-olds. The subject areas assessed have included reading, writing, mathematics, science, and social studies, as well as citizenship, literature, art, music and career development. In 1983-84, NAEP began sampling students by grade as well as by age. The 1983-84 reading proficiency data reported here are based on students in grades 4, 8, and 11. The school problems data are based on responses to questionnaire items by the principal of each sample school.

Sampling

The NAEP reading assessment employed a stratified three-stage sampling design. The first stage of sampling entailed defining primary sampling units (PSUs)--typically counties, but sometimes aggregates of small counties; classifying them into strata defined by region and community type; and randomly selecting among them. For each age and grade level, the second stage entailed enumerating, stratifying, and randomly selecting schools, both public and private, within each PSU selected at the first stage. The third stage involved randomly selecting students within a school for participation in NAEP. The 1983-84 NAEP reading assessment sample is nationally representative of school children ages 9, 13, and 17 and in grades 4, 8, and 11.

Content of the Reading Assessment

The assessment contained a range of reading tasks developed on the basis of a set of objectives developed by nationally representative panels of reading specialists, educators, and concerned citizens. NAEP asked students to read prose passages or poems and answer questions about them. The passages were drawn from a variety of genres. The questions about the passages included a range of multiple-choice questions that required students to locate specific information, to make inferences based on information in two or more parts of a passage, and to recognize the main idea. Open-ended questions were also used that asked students to provide written interpretations or evaluations of passages.

Balanced Incomplete Block (BIB) Design

The 1983-84 NAEP design used a variant of matrix sampling called balanced incomplete block (BIB) spiraling. With this procedure, the total assessment battery was divided into 21, 14-minute blocks as well as a 6-minute block common to all

students at that grade level. Each student was administered a booklet containing 3 blocks as well as a 6-minute block of background questions common to all students. Thus, the total assessment time for each student was just over three-quarters of an hour.

The BIB part of the method assigns blocks of exercises to booklets in such a way that each block appears in the same number of booklets and each pair of blocks appears in at least one booklet. This generates a large number of different booklets. The spiraling part of the method then cycles the booklets for administration, so typically no two students in any assessment session in a school, and at most only a few students in schools with multiple sessions, receive the same booklet. At each age/grade level, each block of exercises was administered to approximately 2,000 students and each pair of blocks to approximately 200 students.

The background variables employed in this study include items in the common 6-minute block, administered to all assessed students, and items in the spiraled blocks to which a smaller number of students responded. With BIB spiraling, correlations may be calculated among all background items and exercises (whether in the same booklet or different booklets) on some subset of students, although different correlations will be based on different student subsamples. This permits estimation of the complete matrix of correlations among exercises within a subject area and the subsequent mapping of the structure of achievement in that domain.

IRT Scaling

Item response theory (IRT) technology was used to estimate reading proficiency levels. IRT defines the probability of answering an item correctly as a mathematical function of proficiency level or skill. One main purpose of applying IRT analysis in this instance was to allow development of a common scale on which performance can be compared across groups and subgroups whether tested at the same time or a number of years apart. (NAEP elected to use a scale that ranges from 0 to 500 with a mean of 250 and a standard deviation of 50.) Using IRT techniques, performance for any group, or subgroup, can be estimated even though all respondents did not take all exercises in the NAEP pool. NAEP estimates of means and distributions describing national and group proficiency are computed as expected values of the figures that would have been obtained had individual proficiencies been observed, given the data that were in fact observed--that is, responses to reading exercises and background items.

Estimating Variability in Proficiency Measures

The standard error, computed using jackknife replication procedures, provides an estimate of sampling reliability for NAEP

proficiency measures. It is composed of sampling error and other random error associated with the assessment of a specific item or set of items. Random error includes all possible nonsystematic error associated with administering specific exercise items to specific students in specific situations.

Data Limitations

There are limitations to the NAEP database that apply to the analyses conducted in this report. First, NAEP has only two measures that relate to socioeconomic status of the individual student--reading aids in the home and parental education. More than a third of the 4th graders omitted or answered "I don't know" to the questions concerning the education level attained by their mother or father. Furthermore, student data are self-reported and could not be cross-checked with other sources, such as school records or parent surveys. While an examination of parent and student responses in the High School and Beyond data set revealed 90 percent agreement between parent and 12th-grade students on their father's educational attainment (NCES, 1984), it is unknown how accurate younger students' responses are to this question.

Second, while unbiased estimates of the relationships among various background variables can be produced, unbiased estimates between reading scores and independent variables can be calculated for only 19 student variables, 3 school variables, and no teacher variables. While the use of BIB spiraling and IRT result in more efficient estimations of the distribution of proficiencies in a group of students, one cannot make precise statements about individuals. Therefore, NAEP calculated a plausible distribution of each student's proficiency using selected student background information and selected school variables. Good estimates result when analyses include only the plausible values and one or more of the variables used in estimating these variables. Biases may result when other background variables are involved. For example, with the reading assessment, the actual size of the effect of the non-conditioned variables may be underestimated by as much as 20 percent. Therefore, the regressions run for this project that used reading scores as dependent variables included only variables used to estimate the plausible values as control variables. Four of the eight school problems variables were included in the conditioning: student absenteeism, lack of parent interest, discipline, and low standards for students.

Content of Background Questionnaires

In 1983-84, NAEP also included a broad set of student, teacher, and school survey questions. The student demographic characteristics and home environment data used in this analysis were reported by the student: language spoken in the home, family education, and the presence of various reading aids in the home.

The student background characteristics used as control variables in the multiple regression were coded as follows:

Imputed race/ethnicity dummy coded:
Black = 1 if black
= 0 if white
Hispanic = 1 if Hispanic
= 0 if white

Non-English speaking (language spoken in the home):
1 = Not English
0 = English

Parental education (higher of mother or father):
1 = less than high school
2 = graduated high school
3 = more than high school
4 = graduated college

Number of reading aids (sum of "yes" answers to presence of newspapers, dictionaries, encyclopedias, 25 or more books, magazines, and computers in the home).
0 to 6

Information about the students' schools was collected from a questionnaire filled out by the school's principal. (See table A5 for information about sample size.) It included characteristics such as number of students enrolled and student body characteristics (percentage in Federal lunch program, percentage minority, etc). The school climate information was gathered by asking principals the following question:

Below is a partial list of school problems. To what degree are they characteristic of your school?

	Serious	Moderate	Minor	Not a problem
Student absenteeism	A	B	C	D
Lack of parent interest	A	B	C	D
Discipline	A	B	C	D
Lack of teacher commitment or motivation	A	B	C	D
Teacher absenteeism	A	B	C	D
Teacher turnover	A	B	C	D
Low standards for students	A	B	C	D
Inadequate materials and equipment	A	B	C	D
Class size	A	B	C	D
Vandalism	A	B	C	D
Physical assaults among students	A	B	C	D
Student abuse of teacher	A	B	C	D
Robbery or theft	A	B	C	D
Student use of drugs or alcohol	A	B	C	D

Responses to these items were coded as follows: 1 for "not a problem," 2 for "minor" problem, 3 for "moderate" problem, and 4 for "serious" problem.

The average rating of school problems variables is the average for each school of the principal's ratings of the 8 school problem items. (Each problem was weighted equally in computing the average, i.e. the scores on the eight items were summed and divided by 8.) The averages were grouped as follows:

1 = Not a problem: averages greater than or equal to 1 and less than 1.5.
2 = Minor problem: averages greater than or equal to 1.5 and less than 2.5
3 = Moderate problem: averages greater than or equal to 2.5.

Calculation of Adjusted Scores

Tables A1 and A2 present the results of the regression analysis predicting reading proficiency scale scores from principals' average ratings of school problems. First, a bivariate regression of reading scale scores by average rating of school problems was computed as the basis for the observed reading scores. Then a multiple regression of reading scale scores by student background characteristics and average rating of school problems was computed as the basis for the adjusted reading scores (table A1). The adjusted reading scores (table A2) represent the predicted average reading scale scores for levels of the average rating on school problems after taking student background characteristics into account.

Appendix

List of Supplementary Tables

Table A1 Results of regression analysis of reading scores by average rating of school problems, controlling for race/ethnicity, language spoken in the home, parental education, and number of reading aids in the home for 4th, 8th and 11th graders: 1984

Table A2 Observed and adjusted average reading scale scores by average rating on school problems adjusting for race/ethnicity, language spoken in the home, parental education, and number of reading aids in the home for 4th, 8th, and 11th graders: 1984

Table A3 Sample sizes and standard errors for percentage distribution of students by principals' ratings of school problems, by grade and problem: 1984 (table 1)

Table A4 Sample sizes and standard errors for percentage distribution of schools by average rating of school problems, by grade and control of school: (table 2)

Table A5 Sample sizes and standard errors for percentage distribution of schools by average rating of school problems, by grade, control of school, and proportion of students in Federal school lunch program: 1984 (table 3)

Table A6 Sample sizes and standard errors for average reading proficiency scale scores by principals' ratings of school problems, by grade and problem: 1984 (table 4)

Table A7 Sample sizes for school problems items

Table A1.—Results of regression analysis of reading scale scores by average rating of school problems, controlling for race/ethnicity, language spoken in the home, parental education, and number of reading aids in the home for 4th, 8th, and 11th graders: 1984

Grade and variable	Coefficient*	Standard error	Mean
Grade 4			
Bivariate			
Average school problems	-20.115	0.889	
Y intercept	249.752		
Multivariate			
Percent blacks	-23.860	1.064	0.156
Percent Hispanics	-13.801	1.336	0.117
Percent non-English speaking	-12.345	1.529	0.092
Parental education	5.296	0.447	3.016
Number of reading aids	4.795	0.307	4.380
Average school problems	-9.501	0.893	
Y intercept	201.979		
Grade 8			
Bivariate			
Average school problems	-14.404	0.787	
Y intercept	286.338		
Multivariate			
Percent blacks	-20.006	1.037	0.148
Percent Hispanics	-12.807	1.453	0.090
Percent non-English speaking	-1.332	1.667	0.066
Parental education	6.090	0.327	2.793
Number of reading aids	4.796	0.326	4.863
Average school problems	-7.040	0.794	
Y intercept	237.042		
Grade 11			
Bivariate			
Average school problems	-16.965	0.831	
Y intercept	323.289		
Multivariate			
Percent blacks	-22.761	1.252	0.154
Percent Hispanics	-9.128	1.745	0.082
Percent non-English speaking	-13.038	1.862	0.062
Parental education	7.383	0.378	2.784
Number of reading aids	4.669	0.427	5.001
Average school problems	-7.513	0.861	
Y intercept	265.317		

*For the multivariate analyses, the regression coefficients represent the unique contribution of each variable.

SOURCE: National Assessment of Educational Progress, 1983-84 Reading Assessment, unpublished calculations, 1987.

Table A2.—Observed and adjusted* average reading scale scores by average rating on school problems adjusting for race/ethnicity, language spoken in the home, parental education, and number of reading aids in the home for 4th, 8th, and 11th graders: 1984

Grade and average rating on school problems	Average reading scale score	
	Observed	Adjusted
Grade 4		
Not a problem	229.6	223.0
Minor problem	209.5	213.5
Moderate problem	189.4	204.0
Grade 8		
Not a problem	271.9	266.1
Minor problem	257.5	259.1
Moderate problem	243.1	252.0
Grade 11		
Not a problem	306.3	296.7
Minor problem	289.4	289.1
Moderate problem	272.4	281.6

*The adjusted reading scale scores were calculated for each grade from

$$Y(j) = A + B(1)\ E(1)+...+B(5)\ E(5) + jC$$

where j = value for level of average school problem:
1 for "not a problem"
2 for "minor problem"
3 for "major problem"

Y(j) = the adjusted scale score for the jth level of average school problems (j = 1 to 3)

A = the Y intercept from the multiple regression

B(k) = the unstandardized multiple regression coefficient for the kth control variable (k = 1 to 5)

E(k) = the expected value or mean of the kth control variable (k = 1 to 5)

C = the unstandardized multiple regression coefficient for the average school problems variable

For example, the adjusted reading scale score for 4th graders in school with an average rating of "not a problem" (j=1) on the school problems variable was calculated by adding the Y intercept, (201.979), the coefficient times the mean for each of the control variables (i.e. for blacks, -23.860 times 0.156), and the coefficient for average school problems (-9.501) times one (the value of j = "not a problem").

SOURCE: National Assessment of Educational Progress, 1983-84 Reading Assessment, unpublished calculations, 1987.

Table A3.—Sample sizes and standard errors for percentage distribution of students by principals' ratings of school problems, by grade and problem: 1984 (table 1)

Grade and school problem	Number of students	Extent of problem in school			
		Not a problem	Minor	Moderate	Serious
4th grade					
Student absenteeism	16,195	2.6	2.7	1.9	0.7
Lack of parent interest	16,289	2.5	2.5	2.8	0.9
Discipline	16,210	2.4	2.9	2.4	0.4
Lack of teacher commitment/ motivation	16,242	3.1	3.3	1.4	0.3
Teacher absenteeism	16,282	2.9	2.9	1.1	0.2
Teacher turnover	16,207	1.9	1.8	0.7	0.2
Low standards for students	16,192	2.9	2.7	1.2	0.4
Vandalism	16,295	2.6	2.5	1.0	0.0
8th grade					
Student absenteeism	16,498	3.1	3.5	2.5	0.8
Lack of parent interest	16,498	2.3	2.6	2.6	2.0
Discipline	16,373	2.2	3.6	2.9	0.4
Lack of teacher commitment/ motivation	16,450	3.5	3.3	1.9	0.6
Teacher absenteeism	16,499	3.6	3.8	1.7	0.5
Teacher turnover	16,475	2.9	2.9	1.5	0.7
Low standards for students	16,352	3.5	3.6	1.5	0.4
Vandalism	16,413	2.7	2.6	1.4	0.1
11th grade					
Student absenteeism	17,036	2.8	3.4	4.0	2.1
Lack of parent interest	17,185	2.3	2.7	2.5	2.4
Discipline	17,167	2.5	3.5	3.4	0.7
Lack of teacher commitment/ motivation	17,101	2.6	3.4	2.5	1.3
Teacher absenteeism	17,217	2.1	3.5	3.0	1.1
Teacher turnover	17,217	3.4	3.3	2.1	0.8
Low standards for students	17,005	3.1	2.8	2.2	0.7
Vandalism	17,217	3.5	3.5	2.1	0.5

SOURCE: National Assessment of Educational Progress, 1983-84 Reading Assessment, unpublished calculations, 1987.

Table A4.—Sample sizes and standard errors for percentage distribution of schools by average rating of school problems, by grade and control of school: 1984 (table 2)

Grade and control of school	Number of schools	Average rating of school problems: Not a problem	Moderate	Minor
4th grade	600	2.0	2.0	0.5
Public	478	2.3	2.3	0.6
Private	120	4.3	4.3	0.0
8th grade	437	2.4	2.4	0.7
Public	303	2.9	2.9	1.0
Private	133	4.1	4.0	0.5
11th grade	293	1.9	2.6	2.0
Public	246	1.8	2.8	2.4
Private	47	6.1	6.2	1.7

SOURCE: National Assessment of Educational Progress, 1983-84 Reading Assessment, unpublished calculations, 1987.

Table A5.—Sample sizes and standard errors for percentage distribution of schools by average rating of school problems, by grade, control of school, and proportion of students in Federal school lunch program: 1984 (table 3)

Grade, control, and proportion of students in school lunch	Number of schools	Average rating of school problems: Not a problem	Minor	Moderate
4th grade	600	2.0	2.0	0.5
Under 10 percent school lunch	119	4.1	4.1	0.0
Public	59	5.5	5.5	0.0
Private	59	6.0	6.0	0.0
10 to 49 percent school lunch	215	3.4	3.4	0.5
Public	203	3.5	3.5	0.5
Private	12	—	—	—
50 percent or more school lunch	238	3.2	3.2	1.2
Public	196	3.6	3.6	1.4
Private	41	7.2	7.2	0.0
8th grade	437	2.4	2.4	0.7
Under 10 percent school lunch	102	4.6	4.6	0.0
Public	24	—	—	—
Private	77	4.6	4.6	0.0
10 to 49 percent school lunch	166	3.9	3.9	0.5
Public	154	4.0	4.0	0.6
Private	12	—	—	—
50 percent or more school lunch	146	4.1	4.1	2.2
Public	114	4.7	4.7	2.7
Private	32	8.8	8.8	2.1
11th grade	293	1.9	2.6	2.0
Under 10 percent school lunch	84	4.3	4.8	2.8
Public	49	5.6	6.7	4.8
Private	35	6.6	6.9	2.2
10 to 49 percent school lunch	128	2.5	3.7	3.1
Public	127	2.5	3.7	3.1
Private	1	—	—	—
50 percent or more school lunch	60	2.8	6.0	5.7
Public	56	2.7	6.2	6.0
Private	4	—	—	—

— Insufficient sample size for estimates.
SOURCE: National Assessment of Educational Progress, 1983-84 Reading Assessment, unpublished calculations, 1987.

Table A6.—Sample sizes and standard errors for average reading proficiency scale scores by principals' ratings of school problems, by grade and problem: 1984 (table 4)

Grade and school problem	Number of students	Extent of problem in school			
		Not a problem	Minor	Moderate	Serious
4th grade					
Student absenteeism	16,195	1.6	1.6	2.0	4.0
Lack of parent interest	16,289	1.5	1.0	1.6	2.2
Discipline	16,210	1.5	1.2	1.6	5.6
Lack of teacher commitment/ motivation	16,242	1.6	1.6	3.1	24.4
Teacher absenteeism	16,282	1.5	1.5	4.2	3.5
Teacher turnover	16,207	1.1	1.7	5.1	3.9
Low standards for students	16,192	1.3	1.7	3.2	7.1
Vandalism	16,295	1.3	1.2	3.4	—
8th grade					
Student absenteeism	16,498	1.0	1.4	2.2	6.1
Lack of parent interest	16,498	1.6	1.2	1.3	1.9
Discipline	16,373	1.5	1.0	1.5	5.8
Lack of teacher commitment/ motivation	16,450	1.3	0.9	2.7	10.3
Teacher absenteeism	16,499	1.1	1.2	2.7	8.0
Teacher turnover	16,475	0.9	1.6	3.3	5.8
Low standards for students	16,352	1.1	1.1	2.4	1.6
Vandalism	16,413	1.0	1.1	4.6	11.7
11th grade					
Student absenteeism	17,036	2.1	1.0	1.6	2.3
Lack of parent interest	17,185	2.0	1.2	1.1	2.2
Discipline	17,167	1.7	1.1	1.4	6.0
Lack of teacher commitment motivation	17,101	1.8	1.3	1.5	3.1
Teacher absenteeism	17,217	1.1	1.3	2.4	3.1
Teacher turnover	17,217	1.0	1.8	4.5	18.8
Low standards for students	17,005	1.3	1.3	1.6	8.8
Vandalism	17,217	1.6	1.3	3.3	2.1

— Insufficient sample size for estimates.
SOURCE: National Assessment of Educational Progress, 1983-84 Reading Assessment, unpublished calculations, 1987.

Table A7.—Sample sizes for school problems items

Grade and school problems	Number of principals rating a school problem as: Not a problem	Minor	Moderate	Serious
4th grade/age 9				
Student absenteeism	301	227	59	9
Lack of parent interest	171	214	171	43
Discipline	198	319	81	8
Lack of teacher motivation	307	237	50	3
Student absenteeism	371	194	30	3
Teacher turnover	437	123	29	8
Low standards for students	354	185	46	9
Inadequate materials & equip	263	249	76	9
Class size	270	204	107	17
Vandalism	360	217	22	0
Physical assaults among students	465	124	8	1
Student abuse of teachers	555	42	1	0
Robbery or theft	450	136	11	0
Student use of drugs or alcohol	527	66	3	1
8th grade/age 13				
Student absenteeism	170	195	62	8
Lack of parent interest	104	168	132	31
Discipline	94	255	83	3
Lack of teacher motivation	190	193	47	4
Student absenteeism	244	166	23	4
Teacher turnover	281	119	28	7
Low standards for students	219	163	49	2
Inadequate materials & equip	181	166	70	19
Class size	168	163	89	13
Vandalism	236	169	28	2
Physical assaults among students	293	130	14	0
Student abuse of teachers	361	74	2	0
Robbery or theft	249	168	15	2
Student use of drugs or alcohol	244	153	34	1
11th grade/age 17				
Student absenteeism	51	112	96	28
Lack of parent interest	47	94	114	37
Discipline	47	173	64	7
Lack of teacher motivation	55	155	72	8
Student absenteeism	103	139	44	5
Teacher turnover	163	98	28	3
Low standards for students	110	118	55	5
Inadequate materials & equip	105	127	51	8
Class size	116	123	46	7
Vandalism	102	158	30	2
Physical assaults among students	176	110	5	1
Student abuse of teachers	219	65	7	0
Robbery or theft	96	161	31	4
Student use of drugs or alcohol	37	163	81	10

SOURCE: National Assessment of Educational Progress, 1983-84 Reading Assessment, unpublished calculations, 1987.

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